

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Please amend claims 1-9 and 11-22 as follows:

1. (currently amended): A receiver front end for use in a communications system that employs digitally modulated signals operating in an upstream band of frequencies that is divided into two or more non-overlapping upstream channels, each channel flexibly centered on selected frequencies within the upstream band of frequencies, so long as the channels are non-overlapping, with each channel occupying no more than a predetermined maximum frequency band, the receiver front end comprising;

a down-converter configured to accept a data stream ~~data stream~~ comprising samples of the entire upstream band of frequencies sampled at a rate of at least twice the frequency of the highest frequency in the band and to convert ~~the component channel signals~~ a non-overlapping channel within the band of frequencies to baseband, the down-converter shifting the non-overlapping channel to a baseline center frequency that is the same baseline center frequency for each channel; and

a decimator configured to decimate a down-converted signal received from the down-converter.

2. (currently amended): The receiver front end of claim 1 further comprising a plurality of down-converters configured to down convert to baseband channel signals ~~the component non-~~

overlapping upstream channels flexibly centered on selected frequencies within the upstream band of frequencies in parallel.

3. (currently amended): The receiver front end of claim 2 further comprising a plurality of decimators, each decimator associated with a corresponding down converter, each decimator configured to receive one of the baseband channel signals from a corresponding one of the down-converters and to decimate the corresponding-received baseband channel signal to a digital data stream having two samples for each symbol period of the respective-received baseband channel signal.

4. (currently amended): The receiver front end of ~~claim 3~~ claim 1 wherein the communications system is a data over cable service interface specifications (DOCSIS) compatible communications system.

5. (currently amended): The receiver front end of ~~claim 4~~ claim 1 wherein the receiver front end is configured to down-convert and decimate a DOCSIS data stream comprising digitally modulated signals that fall within non-overlapping upstream channels that are assigned within a 5 to 42 MHz band.

6. (currently amended): The receiver front end of ~~claim 5~~ claim 1 wherein the receiver front end is configured to down-convert and decimate a data stream in which non-overlapping channels are assigned bandwidths of approximately 3.2MHz, 1.6 MHz, .8 MHz, .4MHz, or .2 MHz.

7. (currently amended): The receiver front end of claim 1 further comprising a plurality of down-converters arranged in a tree-structure to iteratively convert to baseband successively smaller portions of the ~~frequency-upstream~~ band of frequencies.

8. (currently amended): The receiver front end of claim 7 wherein the down-converters are configured to iteratively convert to baseband smaller portions of the ~~frequency-upstream~~ band of frequencies until each channel within the band is converted to baseband.

9. (currently amended): The receiver front end of claim 8 further comprising decimators configured to decimate the successively smaller portions of the ~~frequency-upstream~~ band of frequencies.

10. (original): The receiver front end of claim 9 wherein the decimators are configured to decimate each baseband channel to a sample rate that is twice the symbol rate of the baseband channel.

11. (currently amended): The receiver front end of claim 1 further comprising an analog to digital converter (ADC) configured to receive the ~~full-upstream~~ band of frequencies as an analog signal, to sample the entire upstream band of frequencies at greater than twice highest frequency of the band and to provide the sampled data to the down-converter.

12. (currently amended): A method for down-converting and decimating digitally modulated signals operating in an upstream band of frequencies that is divided into two or more non-overlapping upstream channel signals, each channel flexibly centered on selected frequencies within the upstream band of frequencies, so long as the channels are non-

overlapping, with each channel occupying no more than a predetermined maximum frequency band, the method comprising the steps of;

(A) ~~a down-converter~~ accepting in a down-converter a data stream comprising samples of the entire upstream band of frequencies sampled at a rate of at least twice the frequency of the highest frequency in the band;

(B) ~~the down-converter~~ converting in the down-converter the ~~component non-overlapping~~ upstream channel signals within the upstream band of frequencies to baseband channel signals whereby each non-overlapping channel is shifted to a same center frequency; and

(C) ~~a decimator~~ decimating in a decimator the ~~down-converted~~ baseband channel signals received from the down-converter.

13. (currently amended): The method of claim 12 wherein the step (B) of ~~down-converting~~ converting further comprises the step of:

(B1) ~~a plurality of down-converters~~ down-converting to baseband the ~~component non-overlapping~~ upstream channels signals within the upstream band of frequencies in a plurality of down-converters in parallel.

14. (currently amended): The method of claim 12 wherein the step (C) of decimating further comprising the step of:

(C1) ~~a decimator~~ receiving in a decimator one of the baseband channel signals from a corresponding one of the down-converters, decimating the ~~corresponding~~ received baseband

channel signal to a digital data stream having two samples for each symbol period of the ~~respective~~ received baseband channel.

15. (currently amended): The method of claim 12 wherein the ~~down-converter and decimator down-convert and decimate~~ data stream is a DOCSIS compatible signals ~~data stream~~.

16. (currently amended): The method of claim ~~15~~ 12 wherein the ~~down-converter and decimator down-convert and decimate~~ data stream is a DOCSIS data stream comprising digitally modulated signals that fall within non-overlapping upstream channels that are assigned within a 5 to 42 MHz band.

17. (currently amended): The receiver front end of claim ~~16~~ 12 wherein the ~~down-converter and decimator down-convert and decimate~~ data stream is a data stream in which non-overlapping channels are assigned bandwidths of approximately 3.2MHz, 1.6 MHz, .8 MHz, .4 MHz, or .2 MHz.

18. (currently amended): The method of claim 12 wherein the step (B) of ~~down-converting~~ converting further comprises the step of:

(B2) converting iteratively the non-overlapping channel signals within the band in a plurality of down-converters arranged in a tree-structure ~~iteratively converting to baseband successively smaller portions of the frequency-upstream band of frequencies.~~

19. (currently amended): The method of claim 18 wherein the step (B2) further comprises the steps of:

(B3) ~~converting iteratively the down-converters iteratively converting to baseband~~ smaller portions of the ~~frequency-upstream band of frequencies~~ until each channel within the band is converted to baseband whereby each non-overlapping channel is shifted to a same center frequency.

20. (currently amended): The method of claim 12 further comprising the step of:

(C2) ~~decimators-decimating in decimators~~ successively smaller portion of the upstream band of frequency-frequenciesband.

21 . (currently amended): The method of claim ~~20~~ 12 further comprising the step of:

(C3) ~~the decimators-decimating in decimators~~ each of the baseband channel signals to an ample rate that is twice the symbol rate of each of the baseband channel signals being decimated.

22. (currently amended): The method of claim ~~12~~ 13 further comprising the step of:

(D) receiving the upstream band of frequencies as an analog signal in one or more analog to digital converters (ADCs) ~~receiving the full band analog signal~~, the number of ADCs being fewer than the number of channels in the upstream band of frequencies,

(E) sampling the entire upstream band of frequencies in the ADCs ~~sampling the entire band~~ at greater than twice highest frequency of the band; and

(F) ~~the one or more ADCs~~ providing the sampled data to the down-converters ~~and decimators~~ by one or more ADCs.

Appl. No. 09/695,645  
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23. (new): The receiver front end of claim 1 wherein the baseline center frequency is zero Hz.

24. (new): The method of claim 12 wherein the same center frequency is zero Hz.

Amendments to the Drawings:

A replacement set of drawings, Figs. 1-13, is filed herewith to respond to the objections contained in the Notice of Draftsperson's Patent Drawing Review.

"Annotated Sheets Showing Changes" and "Replacement Sheets" for Figs. 1-3, 6, 10, 12, and 13 are enclosed herewith.

In Fig. 1, the title of element 108 has been changed from "Front End" to "Front End Processor". Support for this change can be found at page 7, lines 19, 20, and 25 where the front end processor 108 is discussed.

In Fig. 2D, frequency reference points are updated to include the 0 Hz reference point and adding MHz units to the 5 MHz, 7 MHz, and the 42 MHz reference points to be consistent with Fig. 2C, for example. The 7 MHz reference point is the point of interference noted in the specification discussion of Fig. 2D at page 8, lines 17-19.

In Fig. 3, the title of element 104 has been changed from "Receiver" to "Receiver System". Support for this change can be found at page 7, lines 15-19 where the receiver system 104 of Fig. 1 is discussed.

In Fig. 6, the input line labeled "102.4" has been changed to "102.4 mega samples per second" to correspond to the specification at page 11, lines 13-16. The subscript on the down-converter 606 is changed to N for the Nth channel represented in Fig. 6 and the output of decimator 612 is changed to CHN for the Nth channel. Support for these changes can be found at page 12, in lines 8-11 where it is indicated there are N channels within the upstream band and down-converters 602, 604, and 606 are dedicated to one of the N channels. Down converter 606



is the last down-converter in the series and consequently corresponds to CHN as also indicated by the CHN output of the decimator 612 connected to down-converter 606.

In Fig. 10, the input line 1002 is changed from "102.4 MHz Input From A/D" to "102.4 Mega Samples Per Second Input From A/D" to correspond to the description in the specification at page 16, lines 15 and 16 where the data input 1002 is discussed to be 102.4 mega-samples per second.

In Fig. 12, the  $I_n$ ,  $Q_n$ , and  $Data_n$  labels associated with data memory 1204 have been changed to correct the channel reference number for channel N, changing  $I_n$ ,  $Q_n$ , and  $Data_n$  to  $I_N$ ,  $Q_N$ , and  $Data_N$ . These changes have been made to be consistent with the naming convention for channel N used in the specification and figures, such as Figs 5, 8, and 13, for example.

In Fig. 13, the reference number for the vectored data, associated with the time tracking unit (time recovery) 1224, has been changed from 1220 to 1226 to properly correspond to unit 1226 in Fig. 12 as the time state storage associated with the time tracking loop (time recovery) 1224. The reference number for the vectored data, associated with the phase tracking loop (phase recovery) 1218, has been changed from 1226 to 1220 to properly correspond to the unit 1220 in Fig. 12 as the phase state storage associated with the phase tracking loop (phase recovery) 1218.